
Cell cycle regulation by MicroRNAs in embryonic stem cells.

Journal:	Cancer Res
Publication Year:	2009
Authors:	Yangming Wang, Robert Blelloch
PubMed link:	19435891
Funding Grants:	Mechanisms of small RNA regulation in early embryonic development, MicroRNA Regulation of Human Embryonic Stem Cell Self-Renewal and Differentiation, Training Grant I

Public Summary:

MicroRNAs are short RNA molecules that do not encode for proteins but rather regulate the production of proteins from messenger RNAs. Importantly, microRNAs have been implicated in a broad range of stem cell roles in both healthy and diseased tissues. MicroRNAs show great promise as both biomarkers and therapeutics for disease. Here, we review how microRNAs regulate cell cycle, a critical property of how cells proliferate. Manipulating cell cycle to enhance stem/progenitor cell proliferation in degenerative diseases and suppress proliferation in cancer will be of great therapeutic value.

Scientific Abstract:

The cell cycle is tightly orchestrated during normal development. Embryonic stem (ES) cells have a unique cell cycle structure, in which the G1/S restriction is largely absent, enabling cells to rapidly move through the G1 phase and enter the S phase. This hastened cell cycle allows the early embryo to rapidly grow. Recent experiments suggest that small noncoding RNAs, the microRNAs (miRNAs), play a central role in achieving this unique cell cycle structure. The responsible miRNAs function by suppressing multiple inhibitors of the G1/S transition. Expression of these miRNAs drops dramatically as the ES cells differentiate and as the G1 phase extends. Some of the same miRNAs are overexpressed in cancers, in which they can promote tumor growth, suggesting common mechanisms of miRNA-regulated cell cycle control in ES cells and cancers. This review discusses these recent findings in the context of broader knowledge of cell cycle control in normal and abnormal development.

Source URL: <https://www.cirm.ca.gov/about-cirm/publications/cell-cycle-regulation-micrnas-embryonic-stem-cells>